Fig. 1
FIRST PREFERRED EMBODIMENT
FREQUENCY SYNTHESIZER APPARATUS

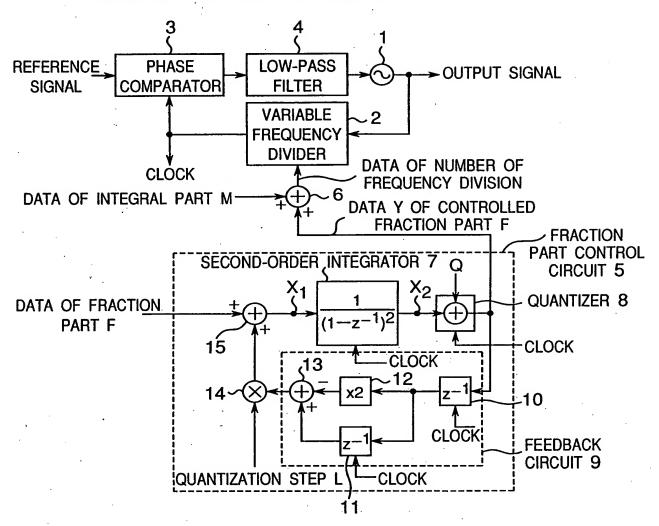


Fig.2

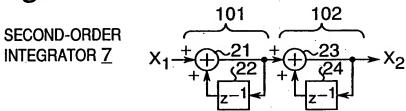
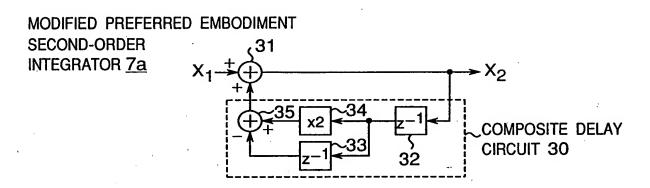
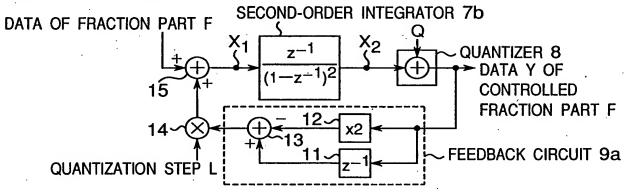


Fig.3



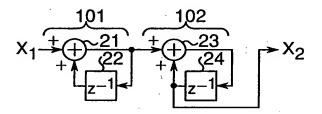
### Fig.4

SECOND PREFERRED EMBODIMENT FRACTION PART CONTROL CIRCUIT <u>5a</u>

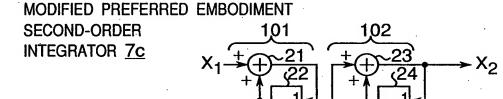




SECOND-ORDER INTEGRATOR 7b



## Fig.6



### Fig.7

MODIFIED PREFERRED EMBODIMENT

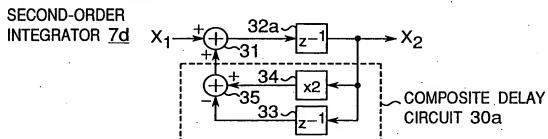
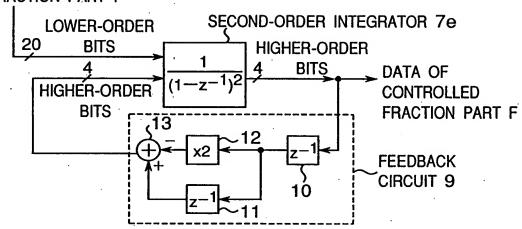


Fig.8

THIRD PREFERRED EMBODIMENT FRACTION PART CONTROL CIRCUIT 5b

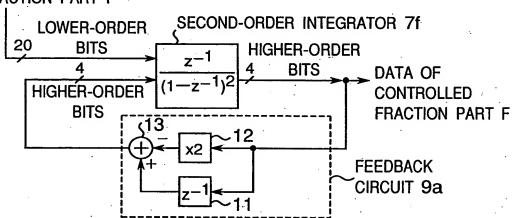
#### DATA OF FRACTION PART F



### Fig.9

FOURTH PREFERRED EMBODIMENT FRACTION PART CONTROL CIRCUIT 5c

### DATA OF FRACTION PART F



## Fig. 10

# FIFTH PREFERRED EMBODIMENT FRACTION PART CONTROL CIRCUIT 5d

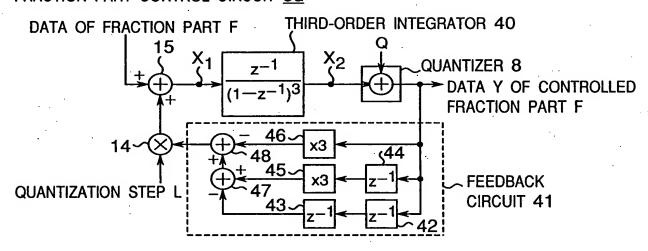
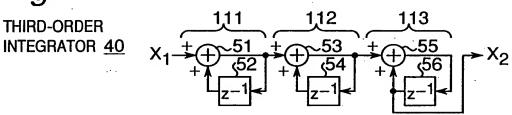


Fig.11



## Fig.12

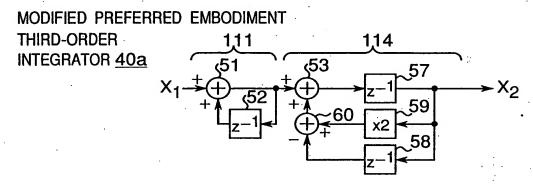


Fig.13

MODIFIED PREFERRED EMBODIMENT THIRD-ORDER INTEGRATOR 40b

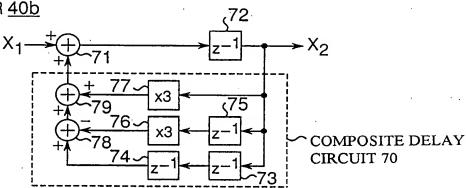


Fig. 14
SIXTH PREFERRED EMBODIMENT
FRACTION PART CONTROL CIRCUIT 5e

**SECOND-ORDER** DATA OF **INTEGRATOR 201** FRACTION PART F 208 QUANTIZER 202 DATA OF CONTROLLED 206 240 207 FRACTION PART F **SECOND-ORDER DELTA-SIGMA** MODULATOR CIRCUIT 200  $-Y_3$ FEEDBACK CIRCUIT 203 **QUANTIZATION** STEP L **SECOND-ORDER** 211 **INTEGRATOR 221** SECOND-ORDER **QUANTIZER 222 DIFFERENTIAL** 228 CIRCUIT 230 227 SECOND-ORDER DELTA-SIGMA **MODULATOR CIRCUIT 220** FEEDBACK CIRCUIT 223

Fig.15

SEVENTH PREFERRED EMBODIMENT FREQUENCY SYNTHESIZER APPARATUS

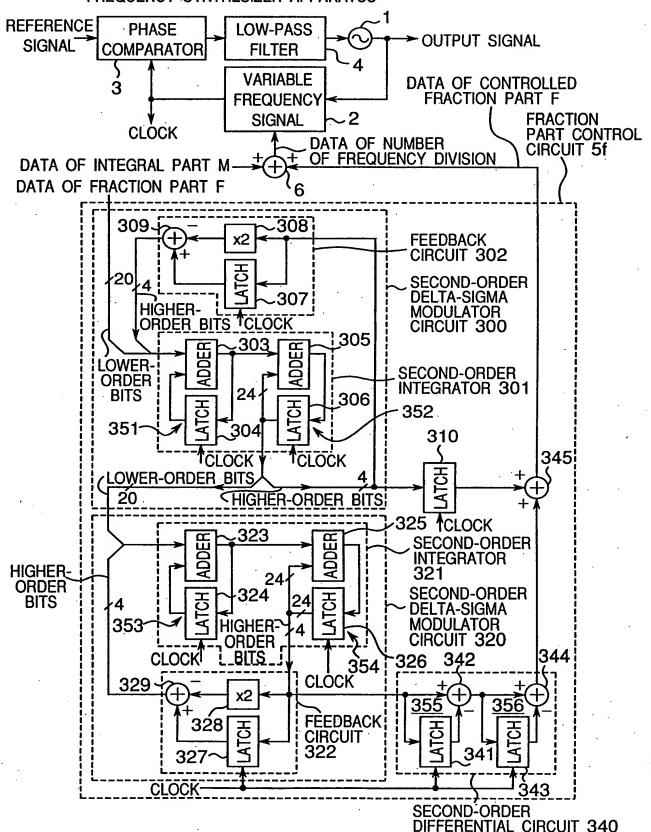


Fig. 16

# EIGHTH PREFERRED EMBODIMENT RADIO COMMUNICATION APPARATUS

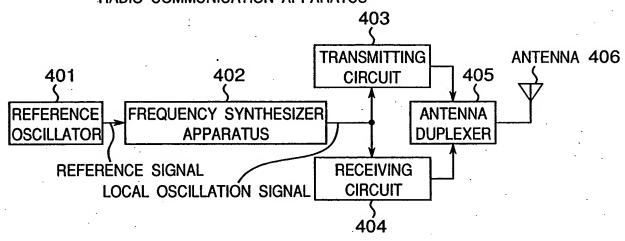
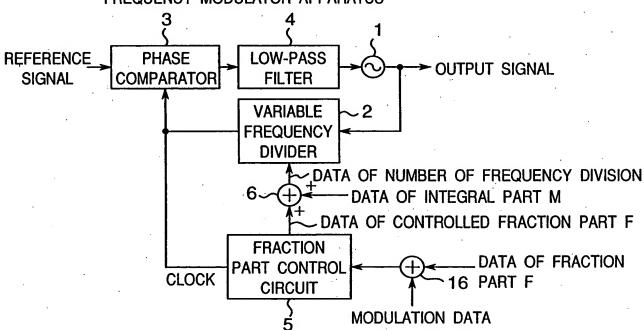
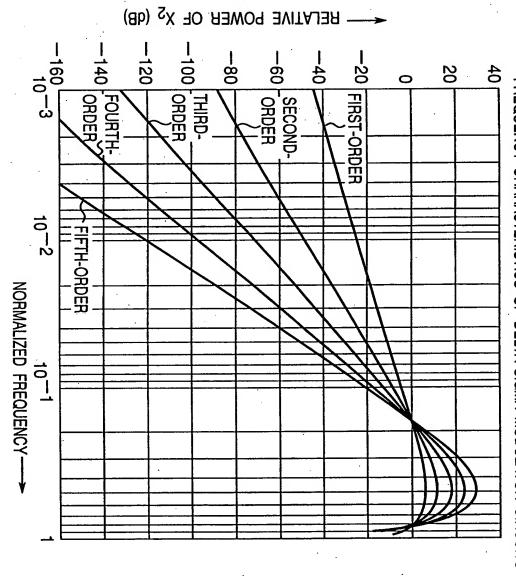


Fig.17

# NINTH PREFERRED EMBODIMENT FREQUENCY MODULATOR APPARATUS

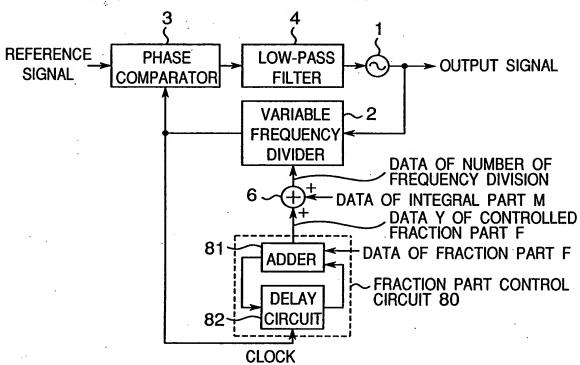




FREQUENCY CHARACTERISTICS OF DELTA-SIGMA MODULATOR CIRCUITS

### Fig.19 PRIOR ART

FREQUENCY SYNTHESIZER APPARATUS



### Fig.20 PRIOR ART

FRACTION PART CONTROL CIRCUIT 80

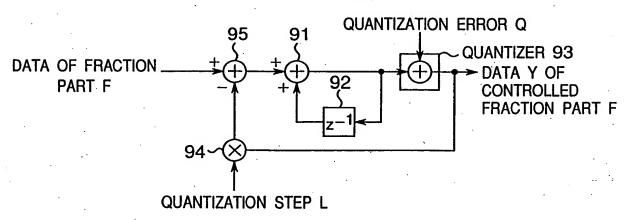


Fig.21 PRIOR ART

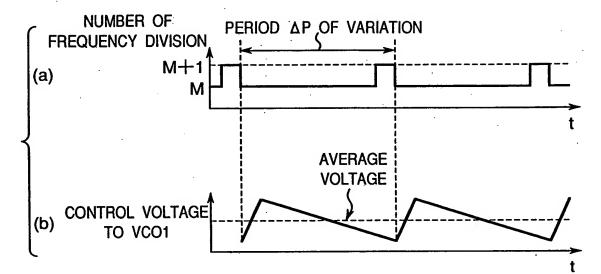


Fig.22 PRIOR ART

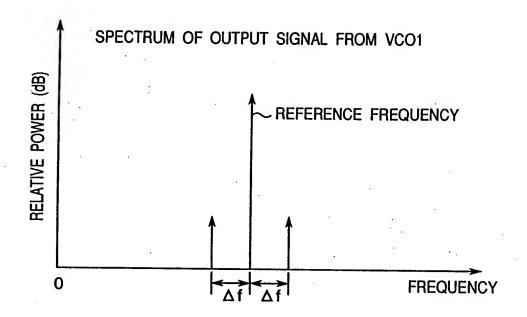


Fig.23 PRIOR ART

